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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/781,931	02/12/2001	James R. Fincke	B-026	1785

7590 07/11/2003
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EXAMINER

STRICKLAND, JONAS N

ART UNIT	PAPER NUMBER
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1754

DATE MAILED: 07/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .		Applicant(s)	
	09/781,931		FINCKE ET AL.	
	Examiner		Art Unit	
	Jonas N Strickland		1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 4/15/03, 6/5/03 and 6/20/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 and 33-61 is/are pending in the application.
- 4a) Of the above claim(s) 47-49, 51-55 and 61 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19, 33-46, 50 and 56-60 is/are rejected.
- 7) ☒ Claim(s) 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>11, 12</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This Detailed Action is in response to the amendment and the Terminal Disclaimer filed on 4/15/03 as Paper Nos. 9 and 10, as well as the prior art filed on 6/5/03 and 6/20/03. Claims 20-32 and 62-87 have been cancelled. Claims 1-19 and 33-61 are currently pending. Claim 57 has been amended in order to overcome a claim objection.

Terminal Disclaimer

2. The terminal disclaimer filed on 4/15/03 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US Patent 5,749,937 and US RE37,853E has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Objections

3. Claim 16 is objected to because of the following informalities: Applicant recites "2000°". It is suggested that Applicant insert -- 2000°C ---. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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5. Claims 1-3, 5, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Anderson (US Patent 3,051,639).

Anderson discloses an arc torch chemical reactor, which relates to chemical reactions promoted by energy from a wall-stabilized electric arc. More particularly the process relates to an improved process and apparatus for the production of acetylene from methane, which employs a gas stream comprised of hydrogen. The reactant stream is passed through an axial reactor and mixed with a heating gas (see Figs. 1-3 and col. 4, lines 38-70). The temperature is maintained at 5000 K, which is a uniform temperature over the length of the reaction zone (col. 5, lines 40-42). Anderson continues to disclose wherein the reactor comprises an insulating layer comprised of carbon, as well as zirconia (col. 5, lines 1-6).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 4, 8-14, 18, 19, 33-36, 41-46, 50, and 56-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson (US Patent 3,051,639) in view of Davis et al. (US Patent 4,335,080), Drouet et al. (US Patent 5,017,754), and McLaughlin (US Patent 3,429,691).

Applicant claims with respect to claim 4, wherein the reactant stream comprises a titanium compound and the desired end product comprises titanium or titanium dioxide.

Anderson discloses a method of converting one or more reactants to a desired product having an axial plasma reactor, with a uniform temperature over the length of a reaction zone. However, Anderson does not disclose wherein the disclosed method may be used for producing titanium or titanium dioxide.

Davis et al. teaches a plasma apparatus, which may be used for producing titanium dioxide (col. 1, lines 50-59).

McLaughlin teaches wherein titanium dioxide may be produced by using a mixture comprised of titanium tetrachloride and oxygen (col. 1, lines 15-47).

Drouet et al. also teaches wherein a plasma reactor may be used for the beneficiation of titaniferous ores and in gas purification and arc starters (col. 7, lines 3-15).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the teachings of Anderson, which teaches an arc plasma system for producing desired end products based on the teachings of Davis et al., McLaughlin and Drouet et al., which teach wherein a titanium dioxide product may be obtained from a plasma arc system, as well as wherein a gas purification process may also be used by a plasma reactor. Such modification would have been obvious because one of ordinary skill in the art would expect a method for producing desired products from a plasma reactor as taught by Davis et al., McLaughlin, and Drouet et al. to be similarly useful and applicable to the plasma process and apparatus for producing desired end product as taught by Anderson.

With respect to claim 8, Anderson teaches wherein the velocity may be varied, therefore, it would have been obvious to one of ordinary skill to reduce the velocity in the reactor in order to recover the desired end product (col. 2, lines 6-22).

With respect to claims 13 and 14, Anderson teaches wherein a cooling layer of water is also applied (col. 3, lines 4-10). Therefore it would have been obvious to expect the gas stream to be cooled.

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With respect to claims 18 and 34, Anderson discloses an injection line, which exhibits a diameter capable of producing a turbulent flow (see Fig. 1).

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson (US Patent 3,051,639) in view of Davis et al. (US Patent 3,954,954).

Applicant claims with respect to claim 7, wherein the temperature of the reaction zone is maintained between about 1500°C and about 2500°C.

Anderson discloses wherein the plasma reactor is maintained at 5000°K.

However, Davis et al. teaches wherein a plasma reactor may be maintained between a temperature range of 1800°K to 5000°K.

Therefore it would have been obvious to one of ordinary skill in the art to modify the teachings of Anderson, which teaches wherein a plasma reactor may be operated at a temperature of 5000°K, based on the teachings of Davis et al., which teaches wherein a plasma reactor may be operated successfully at a temperature range between 1800°K to 5000°K. Such modification would have been obvious to one of ordinary skill in the art, because one of ordinary skill in the art, would have expected a plasma reactor used for chemical synthesis operating at a temperature between 1800°K to 5000°K as taught by Davis et al., to be similarly useful and applicable to a plasma reactor also used for chemical synthesis reactions operating at 5000°K as taught by Anderson.

11. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson (US Patent 3,051,639) in view of Davis et al. (US Patent 4,335,080), McLaughlin (US Patent 3,429,691) and Drouet et al. (US Patent 5,017,754) as applied

to claims 4, 8-14, 18, 19, 33-36, 41-46, 50, and 56-60 above, and further in view of Davis et al. (US Patent 3,954,954).

Applicant claims with respect to claims 15 and 16, wherein the temperature of the reaction zone is maintained between about 1500°C and about 2500°C.

The teachings of Anderson, Davis et al. '080, McLaughlin and Drouet et al. have been discussed with respect to claims 4, 8-14, 18, 19, 33-36, 41-46, 50, and 56-60 however the cited references do not teach wherein the plasma reaction zone is maintained at a temperature range between about 1500°C and about 2500°C.

However, Davis '954 teaches wherein a plasma reactor for carrying out chemical synthesis reactions may be maintained between a temperature range of 1800°K to 5000°K.

Such modification would have been obvious to one of ordinary skill in the art, because one of ordinary skill in the art, would have expected a plasma reaction method as disclosed by Anderson, Davis et al. '080, McLaughlin, and Drouet et al. in which Anderson teaches wherein the temperature is maintained at 5000K, to be similarly useful and applicable to a plasma reaction process as taught by Davis et al. '954, wherein the plasma reactor is maintained at a temperature range of 1800°K to 5000°K.

12. Claims 17 and 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson (US Patent 3,051,639) in view of Davis et al. (US Patent 4,335,080), McLaughlin (US Patent 3,429,691) and Drouet et al. (US Patent 5,017,754) as applied to claims 4, 8-14, 18, 19, 33-36, 41-46, 50, and 56-60 above, and further in view of

McFeaters et al. ("Application of Nonequilibrium Gas-Dynamic Techniques to the Plasma Synthesis of Ceramic Powders").

Applicant claims with respect to claims 17 and 37-40, having convergent-divergent nozzles. The teachings of Anderson, Davis et al., McLaughlin, and Drouet et al. have been discussed with respect to a method for producing desired end products, such as acetylene and titanium dioxide using a plasma reactor. However, the Anderson, Davis et al., McLaughlin, and Drouet et al. do not teach having a coaxial convergent-divergent nozzle.

McFeaters et al. teaches wherein plasma reactors exhibit improved advantages in obtaining the desired end product using converging and diverging nozzles (see p. 433-434). McFeaters also teaches wherein the product cools quickly using the converging and diverging nozzles.

Therefore, it would have been obvious to one of ordinary skill in the art to use converging and diverging nozzles in a plasma reactor, based on the teachings of McFeaters et al., which teaches wherein high cooling rates are achieved using converging and diverging nozzles in a process utilized in a plasma reactor. Such modification would have been obvious to one of ordinary skill in the art, since McFeaters et al, as well as Anderson, Davis et al., McLaughlin, and Drouet et al., are all directed towards a process for producing desired end products using a plasma reactor.

Response to Arguments

13. Applicant's arguments with respect to claims 1-19, 33-46, 50, and 56-60 have been considered but are moot in view of the new ground(s) of rejection.


Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonas N Strickland whose telephone number is 703-306-5692. The examiner can normally be reached on M-TH. 7:30-5:00, off 1st Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0661.

Jonas N. Strickland
July 9, 2003


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